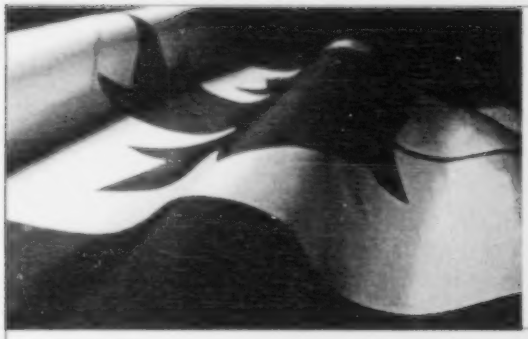

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Examining the Role of Consumer Confidence Within an IS Curve Framework

by

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Abstract

Consumer confidence indices are often viewed as leading indicators of economic activity. In this paper, we investigate the role of these indices in forecasting output growth for the United States and Canada within an IS-curve framework. Our results show that in the case of the U.S. inclusion of consumer confidence helps predict real GDP growth only when movements in confidence are very large, as during the 1990-1991 Gulf War episode. For Canada, on the other hand, we find that, regardless of the magnitude of the change in the confidence index, the inclusion of consumer confidence does not significantly enhance the forecasting properties of our equation.

Résumé

Les indices de confiance des consommateurs sont souvent considérés comme des indicateurs avancés de l'activité économique. Dans cette présente étude, nous examinons la pertinence d'utiliser ces indices à l'intérieur d'une fonction de demande agrégée afin d'aider à prévoir la croissance de la production aux États-Unis et au Canada. Nos résultats montrent que l'inclusion de la confiance des consommateurs peut aider à prévoir la croissance de l'économie américaine, mais seulement lorsque les changements de l'indice sont très grands, comme ce fut le cas durant l'épisode de la guerre du Golfe de 1990-1991. Par contre, pour le Canada, nous trouvons que, peu importe la taille des changements de l'indice de confiance, l'inclusion de la confiance des consommateurs ne permet pas d'améliorer de façon significative les propriétés de prévision de notre équation.

1. Issue and Summary

Consumer confidence surveys have received considerable attention lately both in the U.S. and in Canada as possible indicators of current and future economic activity. While there is little debate that the surveys contain information about consumer attitudes and expectations, it is not clear whether these data would have any value-added in econometric models such as those based on the IS curve. One argument for using these surveys is that they may provide a channel for forward-looking expectations in econometric models. To the extent that future expectations play a role in determining current period dependant variables, the use of these variables should improve the forecasting ability of the model. As suggested by Friedman's (1957) permanent income hypothesis, an important factor that people take into account in determining the optimal path of their consumption is what they expect to earn over their lifetime. However, caution should be exercised, when using confidence indices in econometric models because: (a) the surveys often contain information about the current quarter outlook which would already be captured by other variables in the model, and (b) confidence indices are difficult to forecast, which limits their use in many cases to explaining history or doing only short-term forecasting.

This paper investigates the role of consumer confidence in forecasting real output growth for the U.S. and Canada. Our analysis suggests differing results for both countries. For the U.S. we find that in periods of acute volatility in confidence such as the 1990-1991 Gulf War episode, consumer confidence significantly improves the fit of the IS curve only. When changes in confidence are less extreme, on the other hand, inclusion of this measure does not significantly improve the forecasting ability of the equation. For Canada we find that, regardless of the magnitude change in the confidence index, the inclusion of consumer confidence does not significantly enhance the forecasting properties of the IS curve model.

The remainder of this paper is organized as follows. The next section presents a brief literature review of past work on the use of consumer confidence indices in forecasting. Section 3 presents a descriptive analysis of the most widely followed measures of U.S. and Canadian consumer confidence. Section 4 outlines the empirical framework used in our analysis. Sections 5 and 6 look at the role that consumer confidence plays in forecasting U.S. and Canadian real GDP growth. The final section summarizes our findings.

2. Literature Review

Research on the use of consumer sentiment in forecasting economic variables has had a long tradition in both the U.S. and Canada. In one of the earliest U.S. studies, Mishkin (1978) reports empirical evidence that suggests that the U.S. Index of Consumer Sentiment is useful in predicting the demand for consumer durables. Garner (1991), on the other hand, suggests a more limited role for consumer sentiment in forecasting. Garner's work suggests that while consumer confidence is not particularly useful as a forecasting variable under ordinary circumstances, sharp movements in the index after non-economic events provide potentially useful information about future consumer behaviour.

Other studies by Fuhrer (1993) and Matsusaka and Sbordone (1995) show that confidence variables are generally significant, with their effect large enough to be of practical importance when their current and lagged values are added in different VAR systems. Chauvet and Guo (1998) and the Macroeconomic Advisers (MA) (2002) argue that only non-fundamental economic variations of a consumer sentiment index (which reflect psychological effects, amongst other things) should be considered in equations forecasting consumption variables. By focusing on variations of consumer sentiment that are not supported by changes in fundamentals (like employment, interest rates, etc.) these studies examine the impact of waves of consumers' optimism (or pessimism) on economic fluctuations. This follows from the fact that the fundamental economic factors influencing consumer attitudes are usually the same factors used to explain consumer demand. In general, the studies find that the non-fundamental variations in consumer sentiment play a non-trivial role in affecting current and future variations in aggregate activity. Finally, Desroches and Gosselin (2002) find that consumer confidence indices are useful to forecast aggregate consumer spending in the United States only in periods of major economic or political shocks that are generally associated with high periods of volatility in consumer confidence.

For Canada, Rayfuse (1982) finds that the Conference Board's Index of Consumer Attitudes tends to lead movements in durables expenditures by one quarter. More recent work re-affirms the role of consumer sentiment in forecasting consumer spending in general. Côté and Johnson (1998) assert that consumer attitude is a viable leading indicator of consumer expenditures. Using a

traditional consumption function model, which includes real income, wealth, interest rates and the unemployment rate, the authors find the inclusion of the confidence index to be economically and statistically significant because the index is a measurement of expected income and perception of future economic prospects, which are not fully captured by other variables. Torgunrud (2000) revisits this issue with somewhat different results. Torgunrud finds a strong coincidental relationship between the consumer confidence index and consumer expenditures. However, the paper fails to establish a role for the index in a "well specified model of consumption as the index largely reflects the impact of other economic variables".

3. Description of the Data

In this section we present a brief overview of the consumer confidence data used in our analysis. In the U.S., the two main confidence surveys are the Conference Board Consumer Confidence Survey (CB) and the Index of Consumer Sentiment (MICH) constructed by the Survey Research Centre at the University of Michigan. For Canada we look at the Index of Consumer Attitudes (ICA), produced by the Conference Board of Canada.

The two main U.S. surveys of consumer attitudes are constructed based on consumers' responses to survey questions regarding current and expected economic conditions. As shown in Table 1 below, the University of Michigan survey has a longer history -- it began in 1940 as an annual survey; in 1952 it was converted to a quarterly survey and in 1978 to a monthly survey. The Conference Board Index was first published in 1967 on a bi-monthly basis and was converted to a monthly series in 1977. While the two indices measure the same concept and are highly correlated, the observed month-to-month changes can sometimes diverge significantly. The deviations are mostly explained by methodological differences between both indexes, including differences in sample sizes (which affect sampling error), construction (which affect the range of the movement in the indices), and different release schedules. A detailed description of the methodologies used to construct both indices can be found in Appendix 2.

In Canada, the ICA has been published monthly since December 2001, prior to which it was released on a quarterly basis. The survey comprises four attitudinal questions, and the overall index summarizes the responses to these four questions. As in the U.S., the ICA is quite volatile (both in terms of level and change) with a standard deviation in the change of the index of 6 points over the 1975-2002 period (Table 1). A detailed description of the methodology of the ICA is provided in Appendix 3.

Table 1: Consumer Confidence Surveys in Brief (1975-2002)

	U.S.		Canada
	CB	**MICH***	**ICA**
Coverage			
First Published	1967	1940	1961**
Frequency	Monthly from 1977, Bi-monthly prior to that.	Annual until 1952, then Quarterly until 1978 Monthly since.	Monthly from Dec. 2001, Quarterly prior to that.
Index (Level)			
Max (Date)	142.1 (2000Q3)	110.1 (2000Q1)	132.1 (1987Q2)
Min (Date)	51.4 (1992Q1)	54.4 (1980Q2)	77.7 (1982Q2)
Average	97.6	91.5	108.8
Standard Deviation	22.6	12.9	12.9
Index (Change)			
Max (Date)	18.5 (1992Q2)	16.3 (1983Q2)	15.7 (1983Q1)
Min (Date)	-28.8 (1990Q4)	-14.0 (1990Q4)	-18.1 (1979Q4)
Average	0.48	0.26	0.0
Standard Deviation	8.5	5.0	6.0

*For the Michigan Index the sample period is 1978Q1 to 2002Q1.
**The index has been published on a seasonally adjusted basis since 1967.

4. Empirical Framework

This section outlines the methodology adopted to model consumer confidence in an IS curve specification. We begin with a short introduction to the IS curve equations from the Canadian and the U.S. versions of the small-scale North American Open Economy Macro-Econometric Integrated Model (NAOMI), which form our benchmark models. This is followed by a discussion of the most appropriate manner to model confidence in an IS curve framework.

4.1 Benchmark Model: U.S.

The aggregate demand equation in the U.S. version of the NAOMI model is specified as:

$$\Delta y_t = \rho\Delta y_{t-1} + (1-\rho)\Delta y_t^p + \alpha(SPR_{t-2} - \overline{SPR}) + \beta\Delta r_{t-2}^s + Fips_t + \gamma\sum_{i=1}^{3}\left(\frac{\dot{SP}500_{t-i}}{3} - \overline{\dot{SP}500}\right) + \lambda\sum_{i=1}^{8}\frac{\Delta x_{t-i}}{8} + \varphi(\Delta y_{t-1}^f - \Delta y_{t-1}^p) + \varepsilon_t^y \quad (1)$$

Table 2: NAOMI/US IS Curve
Restricted OLS, 1979Q1 to 2002Q1

	ρ	α	β	γ	λ	φ	R_a^2	S.E.E.
Coefficient	0.40	-0.10	-0.13	0.013	-0.02	0.15	0.54	0.53
(p-value)	(0.00)	(0.01)	(0.00)	(0.00)	-	-		

where Δy and Δy^p are the growth rates of real GDP and potential output respectively (quarter-over-quarter, non-annualized), *SPR* is the yield spread defined as the Fed funds rate minus the 10-year rate, $_{SPR}$ is the term premium, r^s is the real Fed funds rate, *Fips* is a fiscal variable[1], $\dot{SP}500$ is the annualized quarterly growth rate of the deflated S&P500 index, Δx is the annualized change in the log of the real exchange rate and Δy^f is foreign output growth. The coefficients on Δy and Δy^p are restricted to sum to one, a restriction not rejected empirically. This specification has been

[1] The fiscal variable *FIPS* is based on the fiscal policy stance approach proposed by Murchison and Robbins (2002). It is defined as: $Fips = \Delta gps_t - 0.35\Delta grev_{t-3}$ where *gps* and *grev* are respectiveley the ratios of government spending as a proportion of potential output and governement revenues as a proportion of potential.

estimated by restricted ordinary least squares over the sample 1979Q1 to 2002Q1.[2] The estimated results of the IS Curve are presented in Table 2.

4.2 Benchmark Model: Canada

The IS curve in NAOMI/Canada is specified as:[3]

$$\Delta y_t = \alpha \Delta y_t^{\,p} + \beta\left(\Delta y_{t-1} - \Delta y_{t-1}^{\,p}\right) + \chi \Delta y_t^{\,us} + \phi \sum_{i=2,3,5,6} \frac{\Delta Slope_{t-i}}{4} + \varphi \sum_{i=2}^{6} \frac{\Delta z_{t-i}}{5} + \lambda \sum_{i=2}^{7} \frac{\Delta pcne_{t-i}}{6} \qquad (2)$$

$$+ Fips_t + \varepsilon_t^y$$

Table 3: NAOMI/Canada IS Curve
OLS, 1974Q1 to 2002Q1

	α	β	χ	ϕ	φ	λ	R_a^2	S.E.E.
Coefficient	0.63	0.28	0.38	-0.42	0.12	0.07	0.50	0.54
(p-value)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)		

where, Δy and Δy^p are the growth rate of real GDP and potential output respectively (quarter-over-quarter, non-annualized), *Slope* is the yield spread defined as the 90-day treasury bill rate minus the 10-year bond rate, *FIPS* is a fiscal variable, Δz is the change in the log of the real exchange rate, Δy^{us} is U.S. output growth, $\Delta pcne$ is the change in the log of the real non-energy commodity price index.

4.3 Incorporating consumer confidence in the IS curves

Two key issues surround the use of confidence indices in forecasting models: (1) is it the *level* or the *change* in confidence that affects real GDP growth? (2) Should the entire confidence index, or only its non-fundamental values enter the forecasting equation? In this sub-section we outline our approach for dealing with these two important issues.

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[2] For a more detailed description of the NAOMI/U.S. IS curve specification, see Vincent (2002).
[3] For a more detailed description of the NAOMI/CANADA IS curve specification, see Murchison (2001).

Using the level of the confidence index in the IS curve implies that any change in confidence would have a permanent effect on the level of real output. Using the change in confidence means that movements would not permanently affect the level of real output. From a theoretical standpoint, therefore, the choice between using the level or change in confidence appears simple: we should use the change in the confidence index because a *temporary* shock to consumer confidence should only have a *temporary* impact on the *level* of output. Our empirical analysis also suggests that the difference in the index provides a better specification[4]. Based on these results and the theoretical foundations, we adopt the first difference of the index as the explanatory variable in our work.

As noted by several previous studies, consumer confidence indices may contain information about the current quarter outlook already captured by other variables (fundamentals) in the IS equation, i.e. there may be some multicollinearity between consumer confidence and the fundamentals.[5] If this is the case, using the actual published index in the model would borrow explanatory power from the fundamental variables in the IS curve equation. The alternative, as suggested by MA (2002) is to regress the change in the confidence index on all the IS curve variables, and then use the errors from this regression (innovation) for the analysis.

We test for the presence of multicollinearity between the change in consumer confidence and the variables included in the IS curve models in two ways: using correlation analysis and estimating the "innovation" in consumer confidence as per MA (2002). A correlation coefficient is a simple but efficient way to measure the linear association between two variables. We enhance this rudimentary statistics by a further test to ascertain if the correlation is *statistically significant*. The estimated *t*-statistic is based on the following equation:

$$t = \frac{r\sqrt{n-2}}{\sqrt{(1-r^2)}},$$

[4] In Appendix 4, we show that using the level of the confidence index in the IS curve does not improve the forecasting ability of the equation in either Canada or the United States.

[5] The undesirable impact of multicollinearity is an increase in the estimated variances, which leads to imprecise parameter estimates and low power when doing hypothesis testing.

where r is the correlation coefficient and n is the size of the sample. The statistic defined by that equation follows the t-distribution with n-2 degrees of freedom. Since t is directly related to r, a large positive r will translate into a large positive t, and so on. Table 4 shows the correlation between the change in consumer confidence and the explanatory variables as they appear in our IS curves. The computed t-score is shown in brackets. The results show that the correlation between changes in consumer confidence and the explanatory variables is quite low for both the U.S. and Canada. Furthermore, a majority of the calculated t-scores are smaller in absolute value than the critical t-value of 1.66 (for 86 degrees of freedom at 5 per cent, one-sided level of significance), implying that the null hypothesis of no significant correlation cannot be rejected[6].

Table 4: Correlation Coefficients between IS curve explanatory variables and the confidence indices (1979Q1-2002Q1)*

	U.S.			Canada
	ΔCB	**ΔMich**		**ΔICA**
Δy_{t-1}	0.17 (1.42)	0.02 (0.18)	Δy^{p}_{t}	-0.03 (0.32)
Δy^{p}_{t}	0.15 (1.38)	0.01 (0.09)	$(\Delta y - \Delta y^{p})_{t-1}$	-0.14 (1.52)
SPR_{t-2}	-0.20 ***(1.91)***	-0.06 (0.55)	Δy^{US}_{t}	0.09 (1.02)
R^{s}_{t-2}	-0.02 (0.18)	0.02 (0.18)	$Avg(\Delta slope)_{t-2,3,5,6}$	-0.27 ***(2.85)***
$Fips_{t}$	-0.14 (1.30)	-0.15 (1.38)	$Avg(\Delta z)_{t-2,6}$	-0.08 (0.85)
$\dot{SP}500_{t-1}$	0.20 ***(1.91)***	0.03 (0.27)	$Avg(\Delta pcne)_{t-2,7}$	-0.17 ***(1.87)***
Δx_{t}	0.01 (0.09)	-0.18 ***(1.70)***	$Fips_{t}$	-0.12 (1.32)
Δy^{f}_{t-1}	-0.19 ***(1.81)***	-0.09 (0.83)		

*Absolute value of the calculated t-stats appears in brackets.

Second, based on Macroeconomic Advisors' approach we calculate the innovation in the consumer confidence series. In this analysis, the first difference of the consumer confidence index is

[6] For each consumer confidence series we also test whether consumer sentiment Granger-causes GDP and we find evidence of Granger causality running only from consumer sentiment to GDP ruling out the need to use simultaneous equations for the estimation.

regressed on lags of itself and other macroeconomic variables from the IS curve specification. The residual term from this regression is interpreted as the exogenous change in consumer confidence (also referred to as the "surprise", "innovation" or the "unexplained change").

Table 5: In-sample fit for the first-step regressions

	U.S.		Canada
	ΔCB	ΔMICH	ΔICA
R_c^2	0.35	0.11	0.15
R_a^2	0.27	0.01	0.08

We find that both for Canada and U.S., the fundamentals do not explain any significant portion of the changes in consumer confidence (adjusted-R^2 is 0.08 for Canada and 0.27 and 0.01 for the U.S. Conference Board and Michigan indices respectively). These low adjusted R^2 values confirm the findings of our correlation analysis. Therefore, incorporating the change in the confidence index rather then the innovation in the change in confidence in the IS curve models should not create any specification problem for our analysis.

Finally, using the change in confidence rather than the innovation in the change also bestows some ancillary benefits to the analysis. First, by eliminating the extra step that using the innovation in confidence would involve, we ensure that no additional noise is added to the confidence variable.[7] Second, using the change in confidence directly instils greater transparency in the results, allowing a more intuitive application of the findings.

[7] The additional noise would come from a less than perfect specification in the first step where the innovation in change in confidence is isolated from the change itself using regression analysis.

5. Does consumer confidence help predict U.S. GDP growth?

5.1 Empirical Results

The restricted OLS framework presented in the section 4.1 is used to test whether the change in consumer confidence plays a role in forecasting output growth in the United States. The confidence-augmented IS curve for the U.S. is specified as:

$$\Delta y_t = \rho\Delta y_{t-1} + (1-\rho)\Delta y_t^{p} + \alpha(SPR_{t-2} - \overline{SPR}) + \beta\Delta r_{t-2}^{5} + Fips_t + \gamma\sum_{i=1}^{3}\frac{\overset{\bullet}{SP500}_{t-i}}{3} - \overline{SP500}$$
$$-0.02\sum_{i=1}^{8}\frac{\Delta x_{t-i}}{8} + 0.15(\Delta y_{t-1}^{f} - \Delta y_{t-1}^{p}) + \sum_{i=0}^{4}\theta_i\Delta Z_{t-i} + \varepsilon_t \qquad (3)$$

where, ΔZ is the change in the confidence index (CB and Mich).

Table 6: IS curve estimation (1979Q3-2002Q1)[8],*

	Base case	ΔCB	ΔMICH
ρ	0.40 (0.00)	0.37 (0.00)	0.41 (0.00)
α	-0.10 (0.01)	-0.08 (0.02)	-0.08 (0.02)
β	-0.13 (0.00)	-0.12 (0.00)	-0.13 (0.00)
γ	0.01 (0.00)	0.01 (0.00)	0.01 (0.00)
θ_1	-	0.03 (0.00)	0.05 (0.00)
R^2_a	0.54	0.64	0.61
SEE	0.53	0.47	0.49

*Numbers in parenthesis are p-values from a *t*-test.

The results summarized in Table 6 show that the specification is relatively robust to the inclusion of consumer confidence. While there is no statistically significant change in coefficients, the parameters on the yield spread and the stock market tend to be slightly smaller. However, the

[8] The diagnostic tests (ARCH, White heteroskedasticity and Breusch-Godfrey Serial Correlation LM test) show an absence of any hetroskedasticity or autocorrelation in the error process.

hypothesis that the parameters are equal to their original values cannot be rejected at the usual confidence levels. Also, regressions in which all the original parameters are set to their baseline values show that the explanatory power of consumer confidence is mostly unchanged.

While the performance varies between indices, both appear to significantly increase the in-sample fit of the base case equation. But is consumer confidence relevant in all cases, or only during periods of extreme fluctuations, as pointed out by previous studies by Garner (1991) and Desroches and Gosselin (2002)? We explore this question in the following sub-section.

5.2 Non-linear case

We test for a non-linear relationship between confidence and output growth by comparing the fitted values obtained from the original IS curve presented in section 4.1 and the version including only the changes in the Conference Board survey of consumer confidence that are greater than one standard deviation over the sample period 1979Q3 to 2002Q1.[9] Figure 1 shows the magnitude of the changes in the CB index over this historical period. Table 7 shows that the in-sample fit of the IS curve is significantly improved when only the changes in the index greater then one standard deviation are included, with the root-mean-squared-error of the in-sample forecast 28 per cent lower than in the base case. Interestingly, the consumer confidence index has no value-added in other periods. Including only the changes in the Confidence Board index that are greater than one standard deviation is somewhat arbitrary, but does include all the important fluctuations over the sample period 1979Q3 to 2002Q1[10].

A good example of the improved fit of the augmented model to forecast changes in output growth is shown in Figure 2. This figure plots the fitted values obtained from the original IS curve and the version including the changes in the Conference Board survey of consumer confidence over the 1990-1991 Gulf war period, a period that coincides with important variations in consumer confidence. The graphic confirms the results shown in Table 7. The improvement is obvious -- while the original version cannot track the growth slowdown from the second quarter of 1990, the

[9] Since changes in the Conference Board index of consumer confidence have higher correlation with changes in output growth than the Michigan index, we use only the former in the remainder of the study.
[10] This includes the 1981 and 1990 recessions, the 1984 economic slowdown, the 1990-1991 Gulf war episode, and the September 11, 2001 terrorist attacks.

augmented specification does remarkably well, capturing both the timing and the magnitude of the slowdown.

Table 7: Analysis of Large Changes in the Conference Board index

		Changes > σ	Changes < σ
Mean error	Original IS curve	-0.08	-0.06
	With CB	-0.07	-0.04
Root mean squared error	Original IS curve	0.68	0.45
	With CB	0.49	0.45
	Improvement from original IS curve	28%	1%
Number of observations		22	66

Based on those results we re-estimate the IS curve including the changes in consumer confidence only for quarters in which the change in the index was larger (in absolute value) than one standard deviation[11,12]. The estimation results for this specification of the IS curve are presented in Table 8[13].

Table 8: IS curve estimation, non linear case
(1979Q3-2002Q1)

	Base case	**Linear ΔCB**	**Non-linear ΔCB**
ρ	0.40 (0.00)	0.37 (0.00)	0.41 (0.00)
α	-0.09 (0.01)	-0.08 (0.02)	-0.08 (0.02)
β	-0.13 (0.00)	-0.12 (0.00)	-0.12 (0.00)
λ	0.01 (0.00)	0.01 (0.00)	0.01 (0.00)
θ_1	-	0.03 (0.00)	0.03 (0.00)
R^2_a	0.53	0.63	0.64
SEE	0.53	0.47	0.48

[11] Over the 1973Q3-2002Q1 period the standard deviation of the Conference Board consumer confidence index is equal to 8.5.
[12] This is analogous to using dummies interacted with the confidence variable.
[13] We assume that the change in ICA is normally distributed, a claim that cannot be rejected based on the Jarque-Bera test for normality.

Because the consumer confidence only adds value in periods of high volatility, the regression results in the non-linear and linear cases are basically similar. The results summarized in Table 8 show that the original specification is relatively robust to the non-linear inclusion of consumer confidence and similar to the linear case, the only noticeable changes being a slightly bigger weight on the change in consumer confidence and a modest increase of the overall explanatory power relative to the linear specification.[14]

Based on this final specification of the consumer confidence in the IS curve we can derive some rules of thumb relating consumer confidence to economic activity. Therefore, using the non-linear estimates, Table 9 reports the impact on the *level* of real GDP of a negative shock equal to one standard deviation of the series. The simulations assume that all other explanatory variables remain unchanged.

Table 9: Impact on real GDP of a permanent one standard deviation negative shock

	Impact on level of real GDP after *x* quarters (in %)		
Survey index	1 quarter	2 quarters	4 quarters
CB	-0.29	-0.41	-0.48

The results indicate that, at times, consumer confidence may have a significant impact on real GDP. A one standard deviation drop in the Conference Board overall index would result in a reduction of 0.5 per cent of the level of real GDP after one year.[15]

[14] We also observe that the statistical properties of the residuals are similar across the different model specifications.
[15] It is important to note that this simulation assumes no change in the index after the first period.

6. Can consumer confidence help forecast real GDP growth in Canada?

Several studies have had some success in using the ICA to predict consumption growth in Canada, [16] but including the ICA in an overall IS equation has not received as much attention. In this section we test for the possibility of using the *change* in the ICA to forecast real GDP growth in Canada within an IS curve framework.

6.1 Empirical Results

An OLS framework is used to test whether the change in consumer confidence plays a role in forecasting output growth in Canada. The confidence-augmented IS curve for Canada is specified as:

$$\Delta y_t = \alpha \Delta y_t^{P} + \beta\left(\Delta y_{t-1} - \Delta y_{t-1}^{P}\right) + \chi \Delta y_t^{us} + \phi \sum_{i=2,3,5,6} \frac{\Delta Slope_{t-i}}{4} + \varphi \sum_{i=2}^{6} \frac{\Delta z_{t-i}}{5} + \lambda \sum_{i=2}^{7} \frac{\Delta pcne_{t-i}}{6}$$
$$+ FIPS + \sum_{i=0}^{n} \theta_i \Delta C_{t-i} + \varepsilon_t^{y} \qquad (4)$$

where, ΔC is the change in ICA.

Our examination suggests that an *average of the first two lags* of the change in ICA is statistically significant in the IS curve specification at the 10 per cent level. We find, however, that the explanatory power of the IS curve (gauged by the adjusted R^2) is not significantly improved by the addition of the confidence variable (Table 10), in contrast to the more encouraging results found for the U.S.

[16] See, for example, Côté and Johnson (1998) and Torgunrud (2000).

Table 10: IS curve estimation (1974Q1-2002Q1)[17]

	Base case	$(\Delta ICA_{-1}+\Delta ICA_{-2})/2$
α	0.63 (0.00)	0.66 (0.00)
β	0.28 (0.00)	0.25 (0.00)
χ	0.38 (0.00)	0.35 (0.00)
ϕ	-0.42 (0.00)	-0.33 (0.01)
φ	0.12 (0.01)	0.12 (0.01)
λ	0.07 (0.00)	0.07 (0.00)
θ_1		0.0003 (0.06)
R^2_a SEE	0.496 0.0054	0.507 0.0054

6.2 Non-linear case: Is consumer confidence more relevant when movements are large?

It can be argued that consumer confidence affects output growth non-linearly as is the case for the U.S. A casual observation of Figure 4 (which plots the output growth, forecast from our base IS curve, and forecast from consumer confidence enhanced IS curve), suggests that, unlike in the U.S., there are no specific episodes where consumer confidence noticeably improves the forecasting ability of the IS curve. Nevertheless, we explore the idea that changes in consumer confidence may be more relevant when these changes are particularly large.[18]

Using the information in Table 1 we can develop a threshold for the change for consumer confidence, above which we would classify the change in ICA as "large". Two natural threshold values are to use one standard deviation (s.d.) of the change and 1.67 s.d. of the change in ICA,

[17] Further analysis of the errors (ARCH and White hetroskedasticity tests) shows an absence of any hetroskedasticity in the error process.

[18] Our other exhaustive testing showed that: (i) positive and negative changes in consumer confidence seem to have impacts of similar (absolute) magnitude on output growth, and (ii) the overall index works better than using any single question from the ICA survey.

isolating the largest 33 and 10 per cent of the changes in ICA respectively.[19] Using these threshold values we create two new confidence series, which have a value of zero if the change in ICA is below the threshold, and are equal to the change in ICA otherwise.[20] These series are then used to test for the hypothesis that consumer confidence carries more information when the changes in the ICA are large.

The tests show that large movements in confidence affect output growth *contemporaneously*, somewhat different than what our analysis using the entire confidence series suggested.[21] Overall, however, there does not seem to be much extra information in the ICA when changes are large: the ICA is not statistically significant at the 5 per cent level when changes are bigger than one or 1.67 s.d., (Table 11).

Table 11: Large Movements in Consumer Confidence Innovation and GDP growth

	Base case	**ΔICA>1 s.d.**	**ΔICA>1.67 s.d.**
α	0.63 (0.00)	0.63 (0.00)	0.63 (0.00)
β	0.28 (0.00)	0.29 (0.00)	0.30 (0.00)
χ	0.38 (0.00)	0.38 (0.00)	0.38 (0.00)
ϕ	-0.42 (0.00)	-0.38 (0.01)	-0.35 (0.01)
φ	0.12 (0.01)	0.12 (0.01)	0.12 (0.01)
λ	0.07 (0.00)	0.08 (0.00)	0.07 (0.00)
θ_1		0.0001 (0.24)	0.0002 (0.07)
R^2_a **SEE**	0.496 0.0054	0.497 0.0054	0.506 0.0054

Note:
1- There are 29 observations (out of a total of 113) where the change in ICA is greater than one s.d. and 12 observations where the change in ICA is greater than 1.67 s.d.

[19] We assume that the change in ICA is normally distributed, a claim that cannot be rejected based on the Jarque-Bera test for normality.
[20] This is analogous to using dummies interacted with the confidence variable.
[21] As noted in section 6.1, consumer confidence affects real output growth with lags when the entire confidence index series is used.

Overall, the results for Canada are not as encouraging as for the U.S.[22] The inclusion of the index (in a linear or non-linear fashion) does not improve the fit of the model significantly. These findings, which are in-line with Torgunrud (2000), suggest that consumer confidence does not have an important role to play in the context of the Canadian forecast of real GDP using NAOMI/Canada.

[22] The differences in results across countries can be a result of a number of factors including differences in the survey methodology, sample and timing.

7. Conclusion

In this paper we investigate the role of consumer confidence indices in forecasting output growth for the U.S. and Canada. Our regression analysis produces mixed results. For the U.S., we find that consumer confidence seems to play a limited role in helping to forecast real GDP growth. The results show that the improvement in fit is driven by particular episodes in history when movements in the index were large, such as during the 1990-1991 Gulf war. Based on this analysis, the results suggest that a one standard deviation (8.5 index points) drop in the CB would lower real GDP (level) by 0.5 percentage points after four quarters in the U.S. For Canada, the findings are not as strong. We find that the ICA is not statistically significant in the Canadian IS curve at the 5 per cent level, and that the inclusion of the confidence index does not significantly improve the forecasting properties of the model, even when the movements in confidence are large.

In closing, it should be noted that this paper does not examine the question of the overall usefulness of consumer confidence indices per se. Instead, we seek to ascertain whether confidence can add additional information to a reduced-form IS curve equation as used in our forecasting models. Therefore, our results do not rule out the usefulness of confidence surveys in general but rather comment on their limited use as leading indicators of output growth within our IS curve specifications.

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Appendix 1: Figures

Figure 1: Conference Board Survey of U.S. Consumer Confidence

1979Q3 to 2002Q1, quarter-over-quarter changes

Figure 2: 1990-91 U.S. Recession and the Impact of Consumer Confidence

Real GDP growth, 1989Q1 to 1992Q4, quarter-over-quarter changes

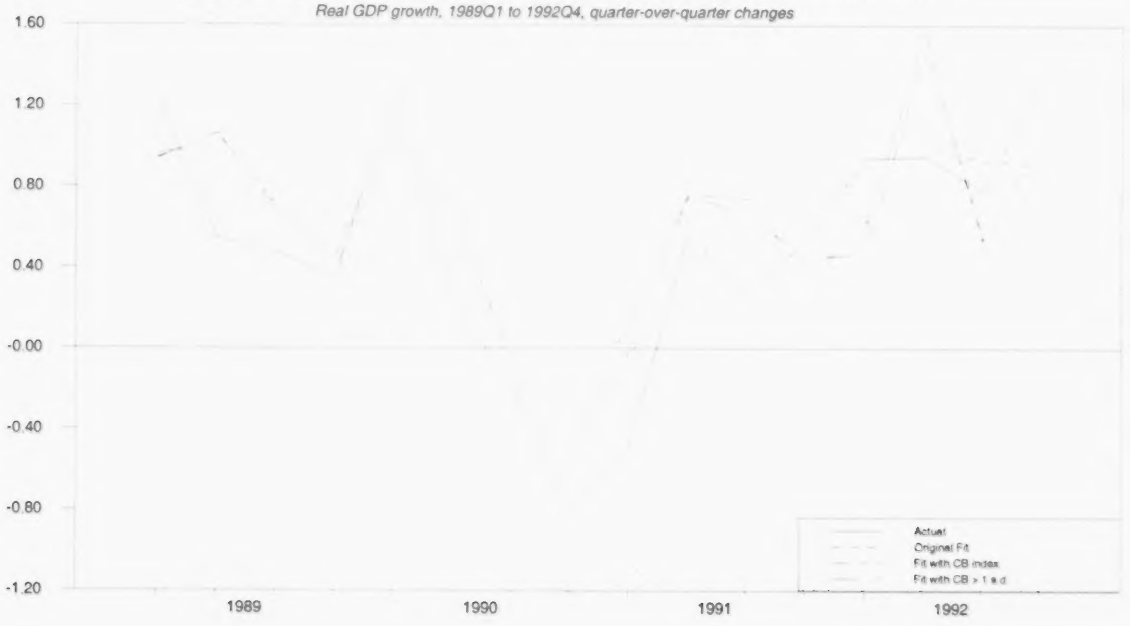

Figure 3: Index of Consumer Attitudes -- Canada

1975q1 to 2002Q1, quarter-over-quarter changes

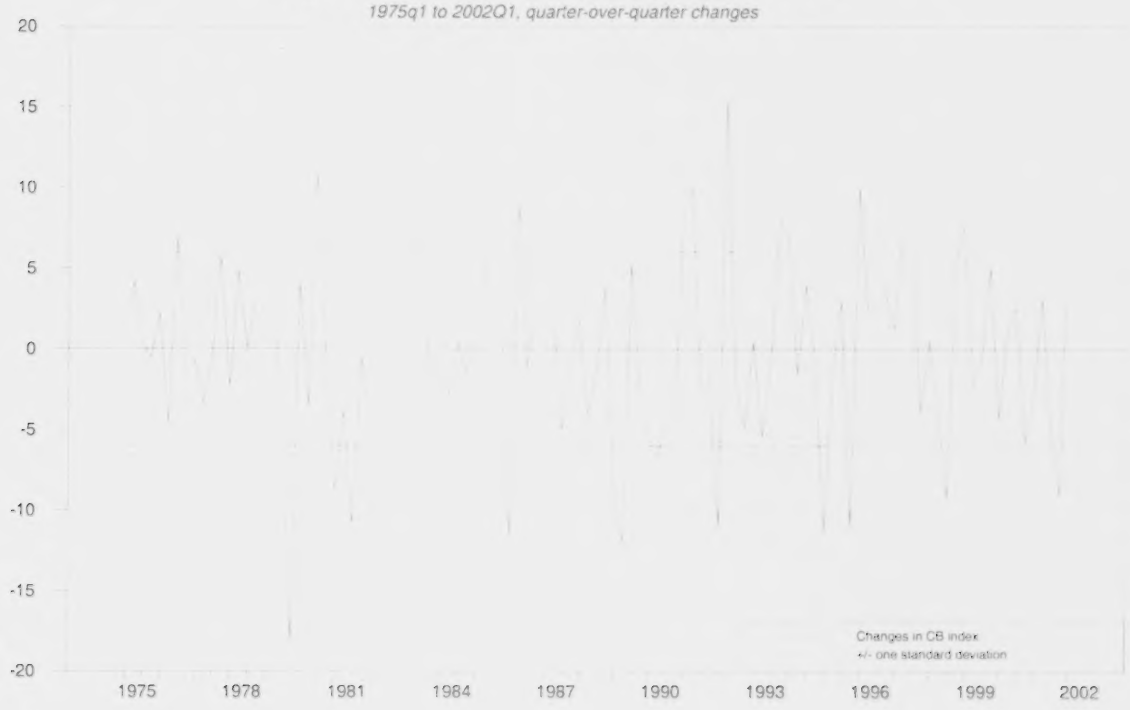

Figure 4: Canada -- IS curve Performance

Real GDP growth, q/q changes

Appendix 2: Consumer Confidence Surveys – U.S.

I) Conference Board Consumer Confidence:

Source: The Conference Board

Frequency: Started in 1967 on a bi-monthly basis, and since 1977 has been published on a monthly basis

Description: The Consumer Confidence Survey is conducted every month to measure the level of confidence individual households have in the performance of the economy. The survey consists of five questions from which a number of aggregate and detailed series are reported. The Conference Board's Consumer Confidence Index is classified as a leading economic indicator by the U.S. Department of Commerce when they report the Business Cycle Indicators.

Methodology: Survey questionnaires are mailed to a nationwide representative sample of 5,000 households, of which roughly 3,500 typically respond. Each month a different panel of 5,000 households is surveyed in order to eliminate bias from the prior month's response.

Present Conditions Questions:

1. How would you rate the present general business conditions in your area? [Good/normal/bad]
2. What would you say about available jobs in your area: plenty, not so many, or hard to get? [Plentiful/not so many/hard to get]

Expectations Questions:

3. Six months from now, do you think they will be better, same, or worse? [Better/same/worse]
4. Six months from now, do you think there will be more jobs, same, or fewer jobs? [More/same/fewer]
5. How would you guess your total family income to be six months from now? [Higher/same/lower]

II) Michigan Survey:

Source: Michigan Survey Research Center

Frequency: Produced quarterly since 1952 and monthly since 1978

Description: The survey is conduct by phone throughout most of the month. Its sample is 500; a preliminary midmonth release is based on about 250 phone interviews conducted early in the month. For each monthly sample, an independent cross-section sample of households is drawn. The respondents chosen in this drawing are then re-interviewed six months later. The total sample for any one survey is normally made up of 60% new respondents, and 40% being interviewed for the second time.

Methodology:

Present Conditions Questions:

1. Do you think now is a good or bad time for people to buy major household items? [Good time to buy/uncertain, depends/ bad time to buy]

2. Would you say that you (and your family living there) are better off or worse off financially than you were a year ago? [Better/same/worse]

Expectations Questions:

3. Now turning to business conditions in the country as a whole - do you think that during the next twelve months, we'll have good times financially or bad times or what? [Good times/uncertain/bad times]

4. Looking ahead, which would you say is more likely – that in the country as a whole we'll have continuous good times during the next five years or so or that we'll have periods of widespread unemployment or depression, or what? [Good times/uncertain/bad times]

5. Now looking ahead – do you think that a year from now, you (and your family living there) will be better off financially, or worse off, or just about the same as now? [Better/same/worse]

Appendix 3: Consumer Confidence Survey -- Canada

Source: The Conference Board of Canada

Frequency: Produced quarterly since 1961, and monthly since December 2001.[23]

Description: The Consumer Confidence Survey is conducted every month to measure the level of confidence individual households have in the performance of the economy. The survey consists of four questions from which a number of aggregate and detailed series are reported.

Methodology:

The Consumer Conference survey asks the following four attitudinal questions:

1) Considering everything, would you say that your family is better or worse off financially than six months ago?

2) Again, considering everything, do you think that your family will be better, the same or worse off financially six months from now?

3) How do feel the job situation and overall employment will be in this community six months from now?

4) Do you think that right now is a good or a bad time for the average person to make a major outlay for items such as a home, a car or some other major item?

Data is also collected on each respondent's age, sex, marital status, occupation and geographic location of residence.

The percentage of respondents who stated positive and negative opinions is calculated by question for each of the socio-economic and regional classifications as well as for the national aggregate. Positive opinions are beliefs that a consumer's financial situation improved over the past six months or will improve over the next six months, that more jobs will be available over the near term or that it is a good time to make a major purchase. Negative responses are defined as a worsening of a household's financial situation over the previous six months, expectations that the financial position or the number of jobs will worsen over the near term, as well as statements indicating that it is a bad time to make a major purchase.

[23] The seasonally adjusted index has been produced since 1967.

The overall index is then derived by adding the percentage of positive responses, subtracting the percentage of negative responses, adding a scalar equal to 400 and indexing the resulting series to a base year of 1991. The scalar is introduced to force the value of the Index to zero if all responses are negative.

Appendix 4: Using the Consumer Confidence index in Level

In the body of our paper we argue that from a theoretical perspective it should be change in the consumer confidence index and not the level of the index that should be included in an IS curve specified in change form. However, does this assertion hold true empirically? We examine this question in this annex.

In order to test whether the *level* in consumer confidence plays a role in forecasting output growth in Canada and the United States, we estimate the IS curves for each country including the level of consumer confidence as one of the explanatory variables. The confidence level-augmented IS curve for the U.S. is then specified as:

$$\Delta y_t = \rho\Delta y_{t-1} + (1-\rho)\Delta y_t^P + \alpha(SPR_{t-2} - \overline{SPR}) + \beta\Delta r_{t-2}^{\$} + Fips_t + \gamma\sum_{i=1}^{3}\frac{\dot{SP}500_{t-i}}{3} - \overline{SP500}$$
$$-0.02\sum_{i=1}^{8}\frac{\Delta x_{t-i}}{8} + 0.15(\Delta y_{t-1}^{f} - \Delta y_{t-1}^{P}) + \sum_{i=10}^{k}\theta_i Z_{t-i} + \varepsilon_t^{y} \qquad (5)$$

and for Canada as:

$$\Delta y_t = \alpha\Delta y_t^{P} + \beta(\Delta y_{t-1} - \Delta y_{t-1}^{P}) + \chi\Delta y_t^{us} + \phi\sum_{i=2,3,5,6}\frac{\Delta Slope_{t-i}}{4} + \varphi\sum_{i=2}^{6}\frac{\Delta z_{t-i}}{5} + \lambda\sum_{i=2}^{7}\frac{\Delta pcne_{t-i}}{6}$$
$$+ FIPS + \theta\sum_{i=1}^{2}\frac{C_{t-i}}{2} + \varepsilon_t^{y} \qquad (6)$$

where, Z is the Conference Board Consumer Confidence index in level (CB) for the U.S., and C is Conference Board Index of Consumer Attitudes for Canada.

Table 12: Confidence Level-Augmented IS Curve Estimation

U.S.			Canada		
	Base case	**CB**		**Base Case**	**ICA**
ρ	0.40 (0.00)	0.39 (0.00)	α	0.63 (0.00)	0.79 (0.00)
α	-0.10 (0.01)	-0.10 (0.01)	β	0.28 (0.00)	0.31 (0.00)
β	-0.13 (0.00)	-0.12 (0.00)	χ	0.38 (0.00)	0.32 (0.00)
γ	0.01 (0.00)	0.01 (0.00)	ϕ	-0.42 (0.00)	-0.44 (0.00)
θ_1	-	0.00 (0.48)	φ	0.12 (0.01)	0.14 (0.00)
			λ	0.07 (0.00)	0.07 (0.00)
			θ		0.00 (0.74)
R^2_a	0.54	0.54	R^2_a	0.50	0.46
SEE	0.53	0.53	**SEE**	0.0054	0.0057
Sample	1973Q3-2002Q1		**Sample**	1974Q1-2002Q1	

*Numbers in parenthesis are p-values from a *t*-test.

The results summarized in Table 12 show that the inclusion of the consumer confidence index (in level form) does not improve the specification of the IS curve: the coefficient for the consumer confidence index is not statistically significant for both Canada and the U.S. These results support our decision to use the change in the confidence index rather than the level of the index in our analysis.